

BACKGROUND

Traumatic injury of the mitral valve and valvular apparatus, including papillary muscle rupture, is exceedingly rare. Less than 30 reports have previously been published on treatment of traumatic papillary muscle rupture. Although the incidence is low, it is a hemodynamically critical injury that confers significant mortality. Given the high energy transfer required to induce injury, these injuries are mostly secondary to motor vehicle collisions. Additionally, these injuries may be underreported in the trauma population owing to concomitant lethal injuries producing high out-of-hospital mortality. In patients who make it to hospital evaluation, diagnosis and management of this injury pattern can be difficult. Through this case we will highlight the presentation, diagnosis, and management of papillary muscle rupture and review current literature regarding the subject.

CASE REPORT

A 46-year-old male presented as a trauma activation following high speed motor vehicle collision. Initial report noted increasing combative state followed by decreased consciousness ultimately requiring field intubation. Upon presentation, primary assessment revealed bradycardia with Type II Heart Block with normotension. Chest X-ray was notable for extensive bilateral pulmonary contusions with negative FAST exam. Computed Tomography was notable for sternal fracture, bilateral pulmonary contusions and right sided acetabular fracture. Upon laboratory evaluation he was noted to have lactic acidosis with lactate of 4 mmol/L and troponin of 10ng/L. He was admitted to the trauma ICU and had progressive shock requiring vasopressor and inotropic support. Subsequently he developed worsening hypercapnic, hypoxemic acidosis, and multisystem organ failure (MSOF) requiring Venovenous (VV) extracorporeal membrane oxygenation (ECMO).

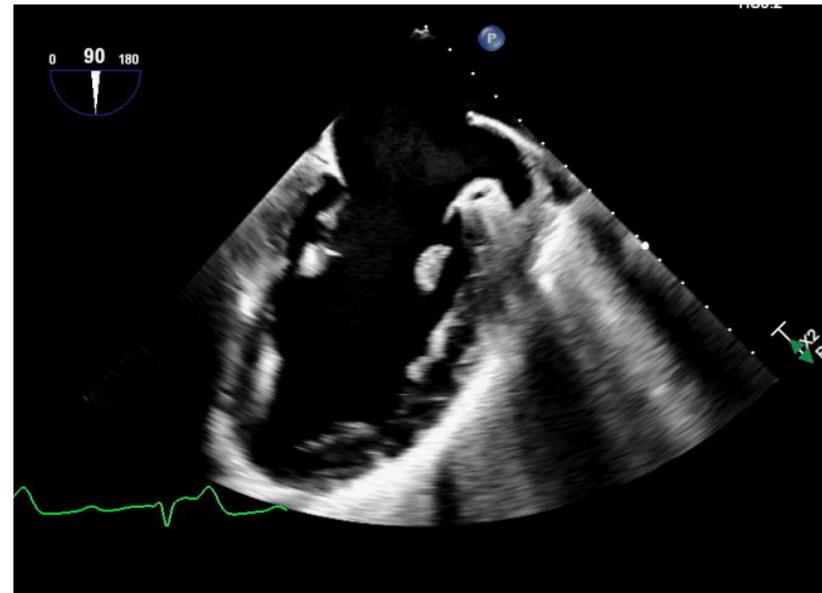


Exhibit 1: TEE Images of Papillary Muscle Rupture

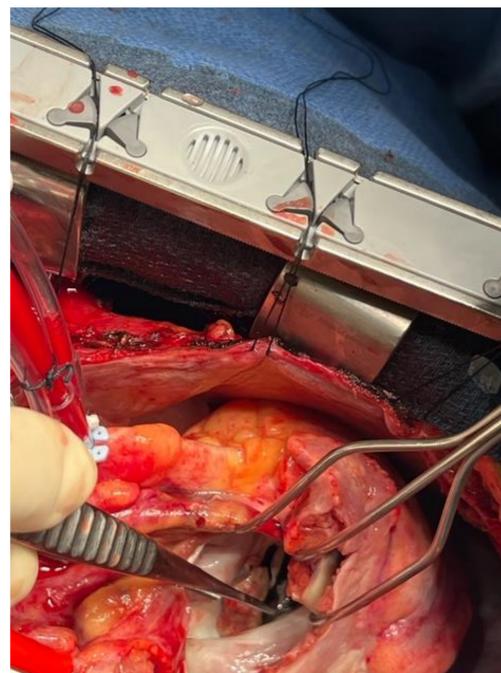


Exhibit 2: Intraoperative Image of Avulsed Papillary Muscle



Exhibit 3: Post-resection Image of Full Thickness, and Partial Thickness Avulsions of the Anterior Medial and Posterior-Lateral Papillary Muscles of the Anterior Mitral Valve Leaflet

CASE REPORT CONTINUED

- A transthoracic echocardiogram was concerning for possible papillary muscle rupture with severe mitral regurgitation and flail of the anterior leaflet.
- TEE also revealed tricuspid valve regurgitation.
- The Patient atient was converted from VV to Venovenous (VA) ECMO for cardiogenic
- The patient was then continued on ECMO support to allow for recovery from MSOF and severe pulmonary edema.
- Day #5 He was taken to the operating room for mitral valve replacement.
- Intraoperatively he was noted to have full thickness avulsion of his anterolateral papillary muscle and partial thickness rupture of his posteromedial papillary muscle.
- Performed Mitral valve replacement with a 29 mm tissue valve, and commissuroplasty of the septal and anterior leaflets of the tricuspid valve.

DISCUSSION

Several studies have examined the incidence of mitral valve injury at post-mortem review. Incidence is expectedly higher in this setting comparative to those surviving to hospital, which is evidenced by the dearth of case reports on this injury pattern. To date, only 25 studies have reported surgical correction acute mitral regurgitation in the setting of traumatic mitral valve and or apparatus injury. Prompt diagnosis and intervention must be undertaken for these patients as physiologic perturbations and hemodynamic collapse ensue at a rapid pace.

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